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History of gymnosperms.—BERRY¹³ has published his paper prepared for the symposium on gymnosperms at the meeting of the Botanical Society at the University of California last August. He outlines the paleobotanical evidence in reference to gymnosperms, which extends more or less continuously from the Devonian to the present time. A diagram not only summarizes the data as to the age and relative abundance of the groups, but also indicates the author's suggestions as to phylogeny. The cycadophyte phylum rises directly from the fern stock through Cycadofilicales, which group in turn gives rise to Williamsoniales, Cycadeoidales, and Cycadales. This splitting up of Bennettiales into two phyla seems to be justified by our increasing knowledge of the *Williamsonia* forms. The Cordaitales are represented as having an independent origin from the fern stock and developing the coniferophytes. The araucarians are credited with being the oldest conifer stock, the groups of Pinaceae being left in a more or less problematical position as to age of origin and ancestral group, and among them the Abietineae are regarded as more modern than the Taxodineae and Cupressineae. Taxaceae and the Ginkgoales are left unconnected, the latter beginning in the later Paleozoic, and the former recognized at the base of the Mesozoic.—J. M. C.

Morphology of *Phylloglossum*.—SAMPSON¹⁴ has investigated this much discussed monotypic genus, chiefly with reference to its "annual storage tuber," the so-called "protocorm" of TREUB. As a result of detailed anatomical investigation, the author concludes that this tuber is "a specialized leafy axis, the terminal bud of which functions both as a means of vegetative reproduction and as an organ of perennation," comparable with the resting buds of *Lycopodium inundatum* and the "tubers" of certain Indian species of *Selaginella*. That in fertile plants the tuber is a modified branch is supported by the following facts: (1) a gap is left in the stele of the main axis by the exit of the vascular strand of the tuber; (2) the stele of the tuber often shows a corresponding gap; and (3) the tuber bears leaves, some of which are considerably reduced. The sterile plant consists of a simple axis, the apex of which has formed a storage tuber. The author concludes that the tuber of *Phylloglossum*, therefore, can no longer be compared with the protocorm of *Lycopodium cernuum*, but the two genera are found to be more nearly related by the fact that *Phylloglossum* is shown to be not characteristically an unbranched form.—J. M. C.

Flavone derivatives in plants.—SHIBATA and KISHIDA¹⁵ find that aerial parts of high mountain plants are generally much richer in flavone bodies

¹³ BERRY, E. W., The geological history of gymnosperms. *Plant World* **19**:27-41. *figs. 2.* 1915.

¹⁴ SAMPSON, K., The morphology of *Phylloglossum Drummondii* Kunze. *Ann. Botany* **30**:315-331. *figs. 5.* 1916.

¹⁵ SHIBATA, K., und KISHIDA, M., Untersuchungen über das Vorkommen und physiologische Bedeutung der Flavonderivate in den Pflanzen. II Mitt. *Bot Mag. Tokyo* **29**:316-332. 1915.

(yellow pigments of the cell sap) than are plants grown on the plains. They believe that these pigments protect the mountain plants against the high insolation (especially actinic rays) of their habitat. Contrary to KERNER, they believe that anthocyanin in the foliage of mountain plants has little protective significance against light, for it develops mainly in the autumn after the light intensity has fallen. They consider the anthocyanin in foliage organs as originating by the reduction of the flavone bodies and thereby offering a problem in cell physiology, rather than being of physiological significance. They do not deny that anthocyanins of the brilliantly colored mountain flowers are of significance as light screens. They also emphasize the protective function of flavone bodies in the white and yellow flowers. The mountain plants show a great reduction in flavone content when they are grown on the plains. For a general statement of the chemical side of this problem the reader is referred to a recent review upon anthocyanins.¹⁶—WILLIAM CROCKER.

Morphology of Isoetes japonica.—WEST and TAKEDA¹⁷ have investigated this species, rather widely distributed in Japan, and the largest species of the genus known, the stem ("caudex" of the authors) of an old plant often attaining 4 cm. in diameter, and in very large specimens a diameter of 8 cm. may be reached. The trilobed caudex consists of two distinct structures, stem and rhizophore, to which the leaves and roots are attached respectively, but on account of the stunted growth all external morphological differentiation between the two organs is lost. The stem apex is a conical mass of tissue at the base of the funnel-shaped depression in the cortex, and in this protuberance no apical cell can be distinguished. The primary vascular axis is "a non-medullated monostele," and no secondary xylem is formed in this species. The rhizophore, a distinct root-bearing organ, is regarded in *Isoetes* "as an organ *sui generis*." The anatomy of stem, rhizophore, and leaf is described in detail. The authors conclude that *Isoetes* "occupies an isolated position amongst recent vascular cryptogams, and is regarded as the sole living representative of the class Isoetales."—J. M. C.

Permeability.—FITTING¹⁸ finds the plasmolytic method rather serviceable for studying the intake of salts by the cells of various plants, especially *Rhoeo discolor*, which was used mainly in the investigation. Permeability to salts of alkali metals (K, Na, and Li) is rather great. It varies with the leaf and is greatest in summer and very slight in winter. The permeability for sodium and potassium salts was about equal and for the lithium salts considerably lower. The permeability was largely determined by the anion, the sulphate

¹⁶ Bot GAZ. 61:349-352. 1916.

¹⁷ WEST, CYRIL, and TAKEDA, H., On *Isoetes japonica* A.Br. Trans. Linn. Soc. London 8:333-376. pls. 23-40. figs. 20. 1915.

¹⁸ FITTING, HANS, Untersuchungen über die Aufnahme von Salzen in lebende Zelle. Jahrb. Wiss. Bot. 56:1-64. 1915.